

REMARKS

Claims 12, 18, and 24-29 have been amended. Claim 18 has been canceled and its subject matter incorporated into amended claim 12. Claim 30 has also been canceled. Claim 31 has been added. Claims 12-17, 19-29 and 31 are now pending. The Title of the Invention has been amended to correspond more closely to the pending claims. Applicant reserves the right to pursue the original claims and other claims in this and other applications. Please reconsider the above-referenced application in light of the foregoing amendments and following remarks.

Claims 24-29 stand rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. patent no. 6,086,442 ("Sandhu"). The rejection is respectfully traversed.

Sandhu does not teach Applicant's claimed field emission display device. Specifically, Sandhu does not teach a current emitter having a top surface, a focal point, or a tip that comprises nitrogen. For example, in Applicant's FIG. 2, current emitter 116 is formed to have a tip 118, *e.g.*, a top surface or focal point, that emits current emissions. Tip 118 is a part of current emitter 116. Applicant's claimed tip 118 has undergone a PECVD hydrogenation process and a subsequent nitrogen plasma process (Applicant's specification, pg. 6, lines 1-4).

Consequently, these treatments change "the chemical nature of the current emitter tip 118." (Applicant's specification, pg. 6, lines 12-13). In particular, Applicant's FIG. 4, illustrates that nitrogen is present in the current emitter tip 118, which is not present in a conventional current emitter tip that has not been treated. Applicant's FIGS. 5 and 6, further illustrate the results of a x-ray photoelectron spectroscopy analysis of emitter tips 118. As can be seen, Applicant's claimed emitter tips 118 possess a different surface chemistry, *i.e.*, reduction of oxygen, silicon, and the presence

of nitrogen. Accordingly, Applicant's claimed emitter tips 118 are structurally different from the prior art.

Sandhu merely relates to forming a field emission device with a *conventional* emitter tip. Sandhu's FIGS. 2 and 3, illustrate *conventional* emitters 48 formed on conductive material layer 46. An insulative layer is formed on conductive layer 46, adjacent to the *conventional* emitters 48, which supports electrically conductive extraction grid 52. Sandhu does not disclose, much less suggest, that emitters 48 are formed to have a focal point, a tip, or a top surface that comprises nitrogen.

The Office Action asserts that Sandhu discloses a current emitter comprising a current emission surface comprising doped silicon infused with nitrogen (pg. 2). The Office Action cites Sandhu's col. 3, lines 11-25 for support. Sandhu's col. 3, lines 11-25, however, do *not* relate to emitters 48 as the Office Action asserts. Sandhu merely discloses that metal layer 56 can undergo nitridization to form a metal nitride (Col. 3, lines 9-12). Metal layer 56 is formed *on* the top surface of electrically conductive extraction grid 52. For example, Sandhu teaches that "an electrically conductive layer 52 [sic] is substantially selectively deposited *over* grid 52." (col. 2, lines 30-33). Accordingly, Sandhu's emitters 48 do not comprise nitrogen: the top surface of the electrically conductive extraction grid 52 does.

Nonetheless, to expedite prosecution and for purposes of clarification, the claims have been amended to recite current emitters with a "focal point [which] comprises nitrogen," as recited in claims 24 and 26, with a "top surface comprising nitrogen," as recited in claim 27, and with a "surface-treated top surface [which] comprises nitrogen," as recited in claims 28 and 29. As indicated above, Sandhu discloses a *conventional* emitter 48 and not Applicant's claimed current emitter.

As such, Sandhu fails to disclose a field emission display device comprising, *inter alia*, "at least one current emitter; and a substrate having a phosphor coating . . . and said current emitter comprising a surface-treated focal point formed on said current emitter, wherein said focal point emits current emissions, and wherein said focal point comprises nitrogen."

Sandhu fails to disclose a field emission display device comprising, *inter alia*, "an array of current emitters; and a substrate having a phosphor coating . . . said current emitters each comprising an emission focal point for emitting current emissions, wherein said emission focal point comprises nitrogen," as recited in claim 26.

Sandhu fails to disclose a field emission display device comprising, *inter alia*, "at least one current emitter; and a substrate having a phosphor coating . . . said current emitter comprising a top and bottom surface, said top surface comprising nitrogen," as recited in claim 27.

Sandhu fails to disclose a field emission display device comprising, *inter alia*, "a current emitter having a top and bottom surface, wherein said top surface is a surface-treated top surface . . . [that] comprises nitrogen; and a substrate having a phosphor coating in at least one region positioned to receive electrons emitted by said current emitter," as recited in claim 28.

Sandhu fails to disclose a field emission display device comprising, *inter alia*, "a plurality of current emitters each having a top and bottom surface, wherein said each top surface is a surface-treated top surface . . . [that] comprises nitrogen; and a substrate having a phosphor coating in at least one region positioned to receive electrons emitted by said current emitters," as recited in claim 29.

Claim 25 depends from claim 24 and should be allowable along with claim 24 for at least the reasons provided above, and on its own merits. Specifically, Sandhu fails to disclose a current emitter with a "surface-treated focal point [that] has atomic concentrations of oxygen and silicon reduced by a plasma enhanced chemical vapor deposition hydrogenation process and a subsequent nitrogen infusion process to values smaller than the atomic concentration of oxygen and silicon of a non-treated focal point subjected to atmospheric conditions," as recited in claim 25.

Claims 12, 18, 19, and 30 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Sandhu in view of U.S. patent no. 5,371,431 ("Jones"). The rejection is respectfully traversed.

For similar reasons provided above, Sandhu does not disclose or suggest Applicant's claimed current emitter tip 118. Sandhu merely discloses a *conventional* emitter 48. Sandhu's discloses that a metal layer 56 undergoes nitridization on the top surface of electrically conductive extraction grid 52. Sandhu does *not* disclose or suggest that emitter 48 comprises nitrogen.

As such, Sandhu fails to disclose or suggest a field emission display device comprising, *inter alia*, "at least one current emitter . . . having a tip . . . [which] comprises nitrogen; and a substrate having a phosphor coating . . . [and] said current emitter further comprising sides below said tip, wherein at least a portion of said sides are surrounded by an insulating layer to prevent current from radiating out of the sides," as recited in claim 12. Jones is relied upon for disclosing the use of an insulating layer, and adds nothing to rectify the deficiencies associated with Sandhu.

Further, Applicant respectfully submits that Sandhu is not a proper prior art reference. The present application was filed on March 4, 2002, and is a divisional of U.S. patent application no. 09/387,776, filed on September 1, 1999. Accordingly, the earliest effective filing date of the present application is September 1, 1999. U.S. Patent No. 6,086,442 ("Sandhu") was filed on March 1, 1999, and issued on July 11, 2000. As a result, Sandhu qualifies as prior art under 35 U.S.C. § 102(e). The subject matter of Sandhu and of the claimed invention were, at the time the invention was made, subject to an obligation of assignment to the same entity: Micron Technology, Inc. The Assignment for this application was recorded in the PTO on September 1, 1999, on Reel 010214, Frame 0100. The Assignee of Sandhu is shown on the face of the reference, which is Micron Technology, Inc. Therefore, section 35 U.S.C. § 103(c) is applicable to the present situation.

According to MPEP § 706.02(l)(1), "[e]ffective November 29, 1999, subject matter which was prior art under former 35 U.S.C. 103 via 35 U.S.C. 102(e) is now disqualified as prior art against the claimed invention if that subject matter and the claimed invention 'were, at the time the invention was made, . . . subject to an obligation of assignment to the same person.'" Accordingly, Sandhu is not a valid prior art reference and should be excluded under 35 U.S.C. § 103.

Claims 18 and 19 depend from claim 12 and should be allowable along with claim 12 for at least the reasons provided above, and on their own merits.

Claims 13-17 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Sandhu and Jones, and further in view of U.S. patent no. 5,840,118 ("Yamazaki"). The rejection is respectfully traversed.

For similar reasons provided above, Sandhu and Jones, alone or in combination, do not disclose or suggest Applicant's claimed current emitter tip 118. Sandhu merely discloses a *conventional* emitter 48. Sandhu's discloses that a metal layer 56 undergoes nitridization on the top surface of electrically conductive extraction grid 52. Sandhu does *not* disclose or suggest that emitter 48 comprises nitrogen. As such, claims 13-17 depend from claim 12 and should be allowable along with claim 12 for at least the reasons provided above, and on their own merits. Specifically, the cited references fail to teach or suggest "at least one current emitter . . . having a tip . . . [which] comprises nitrogen," as recited in claim 12. Yamazaki is relied upon for disclosing a barrier film covering a glass substrate, and adds nothing to rectify the deficiencies associated with Sandhu and Jones.

Moreover, Sandhu is not a valid prior art reference and should be excluded under 35 U.S.C. § 103 since the present application and Sandhu were, at the time the invention was made, subject to an obligation of assignment to the same entity: Micron Technology, Inc.

Claims 20-23 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Sandhu and Jones, and further in view of U.S. patent no. 6,020,683 ("Cathey"). The rejection is respectfully traversed.

For similar reasons provided above, Sandhu and Jones, alone or in combination, do not disclose or suggest Applicant's claimed current emitter tip 118. Sandhu merely discloses a *conventional* emitter 48. Sandhu's discloses that a metal layer 56 undergoes nitridization on the top surface of electrically conductive extraction grid 52. Sandhu does *not* disclose or suggest that emitter 48 comprises nitrogen. As such, claims 20-23 depend from claim 12 and should be allowable along with claim 12 for at least the reasons provided above, and on their own merits. Specifically, the cited

references fail to teach or suggest “at least one current emitter . . . having a tip . . . [which] comprises nitrogen,” as recited in claim 12. Cathey is relied upon for disclosing a silicon grid, and adds nothing to rectify the deficiencies associated with Sandhu and Jones.

Moreover, Sandhu is not a valid prior art reference and should be excluded under 35 U.S.C. § 103 since the present application and Sandhu were, at the time the invention was made, subject to an obligation of assignment to the same entity: Micron Technology, Inc.

Applicant also respectfully submits that the prior art of record fails to teach or suggest the subject matter of newly added claim 31. Claim 31 recites a current emitter comprising, “a top and bottom surface, said bottom surface being formed over a semiconductor substrate, and wherein said top surface is a treated top surface comprising nitrogen.” As indicated above, Sandhu merely discloses a *conventional* emitter. The only element in Sandhu’s structure that undergoes nitridization, is the top metal layer 56 formed on grid 52. Sandhu’s emitter 48 does not comprise any nitrogen components. For at least these reasons, claim 31 should be in condition for allowance.

In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to review and pass this application to issue.

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Respectfully submitted,

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